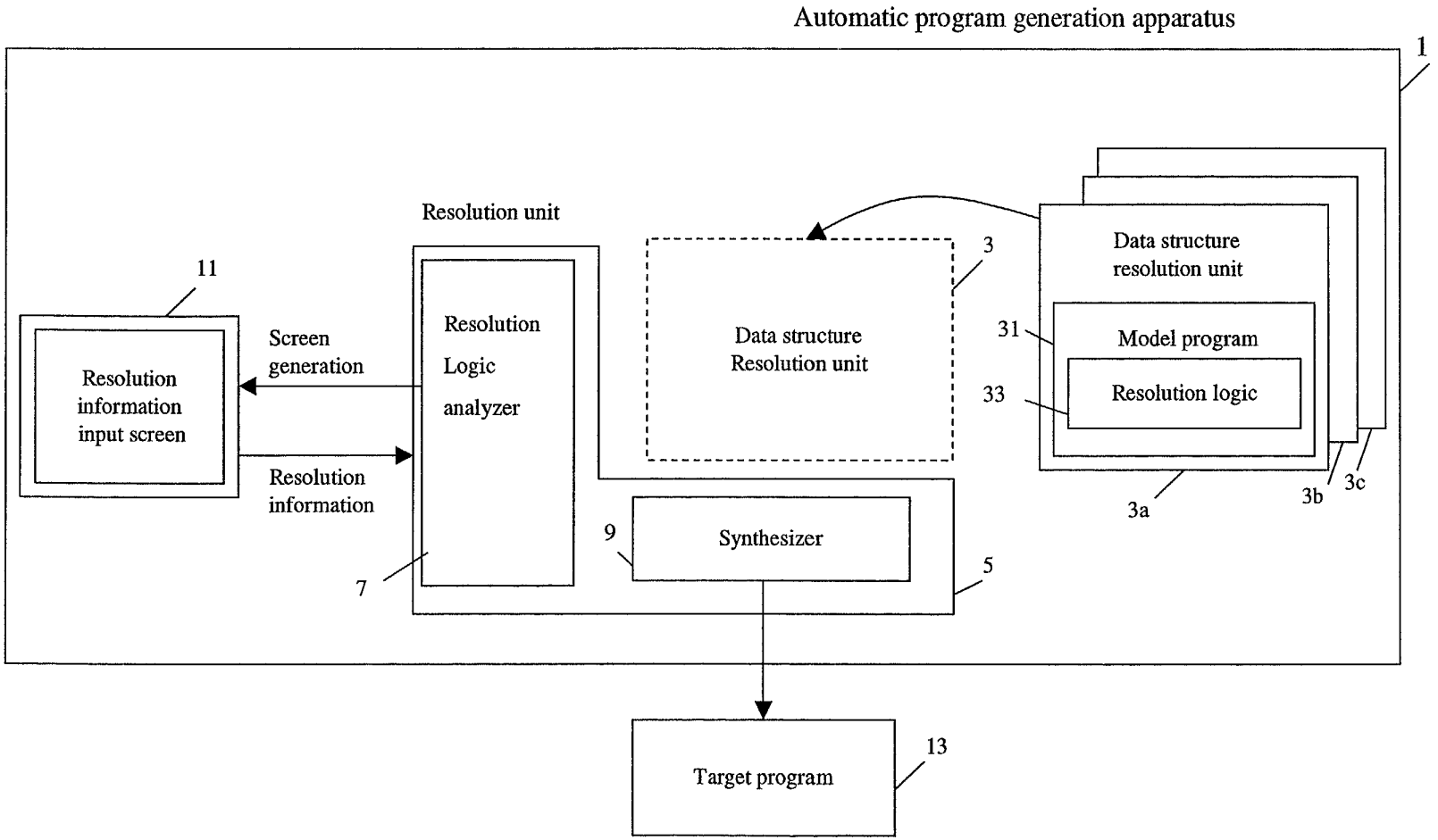

Automatic program generation apparatus
1
Resolution unit
11
Resolution information input screen
Screen generation
Resolution information
Resolution Logic analyzer
7
3
Data structure Resolution unit
Data structure resolution unit
31
Model program
33
Resolution logic
3a
3b
3c
9
Synthesizer
5
Target program
13

Fig.1

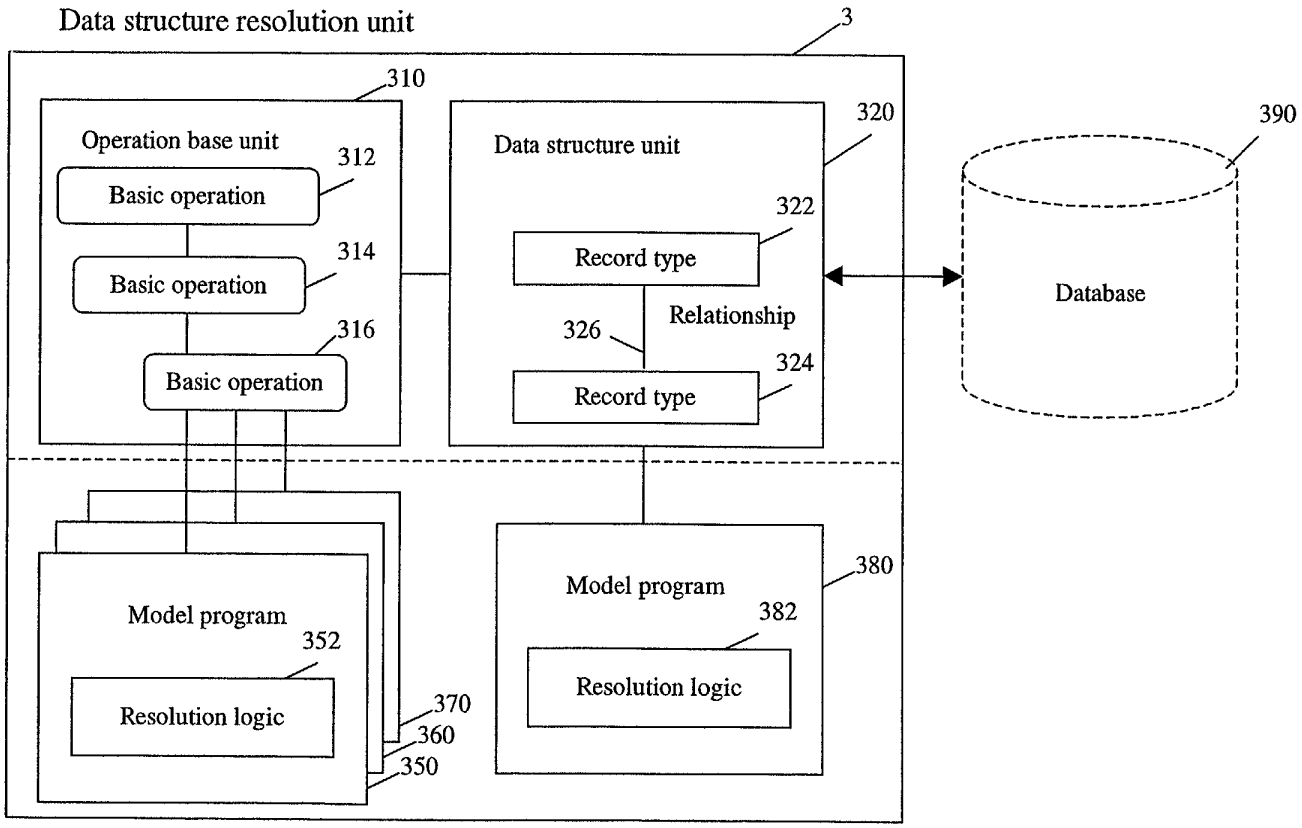

Data structure resolution unit
3
310
Operation base unit
312
Basic operation
314
Basic operation
316
Basic operation
320
Data structure unit
322
Record type
Relationship
326
324
Record type
390
Database
Model program
352
Resolution logic
370
360
350
380
Model program
382
Resolution logic

Fig.2

JP2004-258760

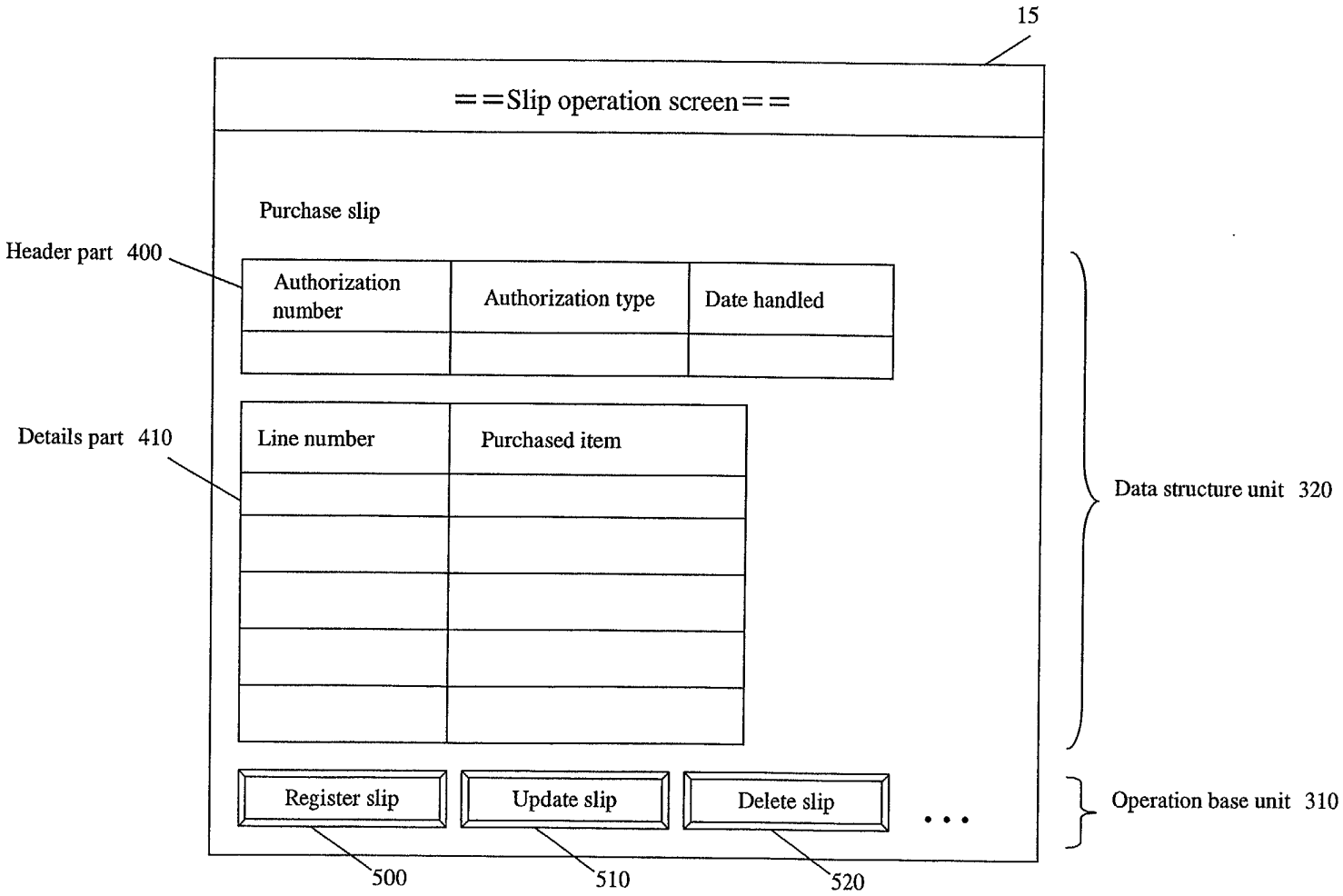


Fig.3

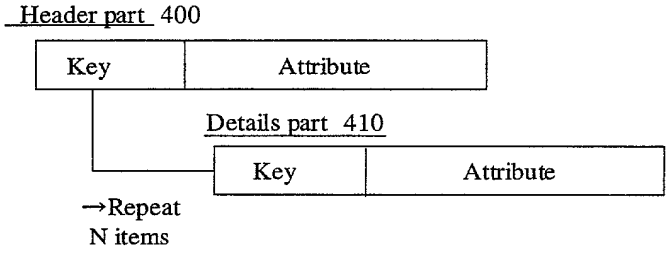


Fig.4

	Header part	Details part
Register slip	Register	Register
Update slip	Update	Update
Add detail	——	Register
. . .	. . .	. . .

Fig.5

```
Model program for slip update
public void《Operation name》(《Slip name》Msg entityInfo)
throws UserException {
  if(《Updateable state name》){
    mapFrom(entityInfo); //Update of attribute
    setState(《State name after update》);//Setting of state
    《Inherent check》
  }else{
    throw new CAAUserException(《Error Message》);
  }
}
```

Fig.6

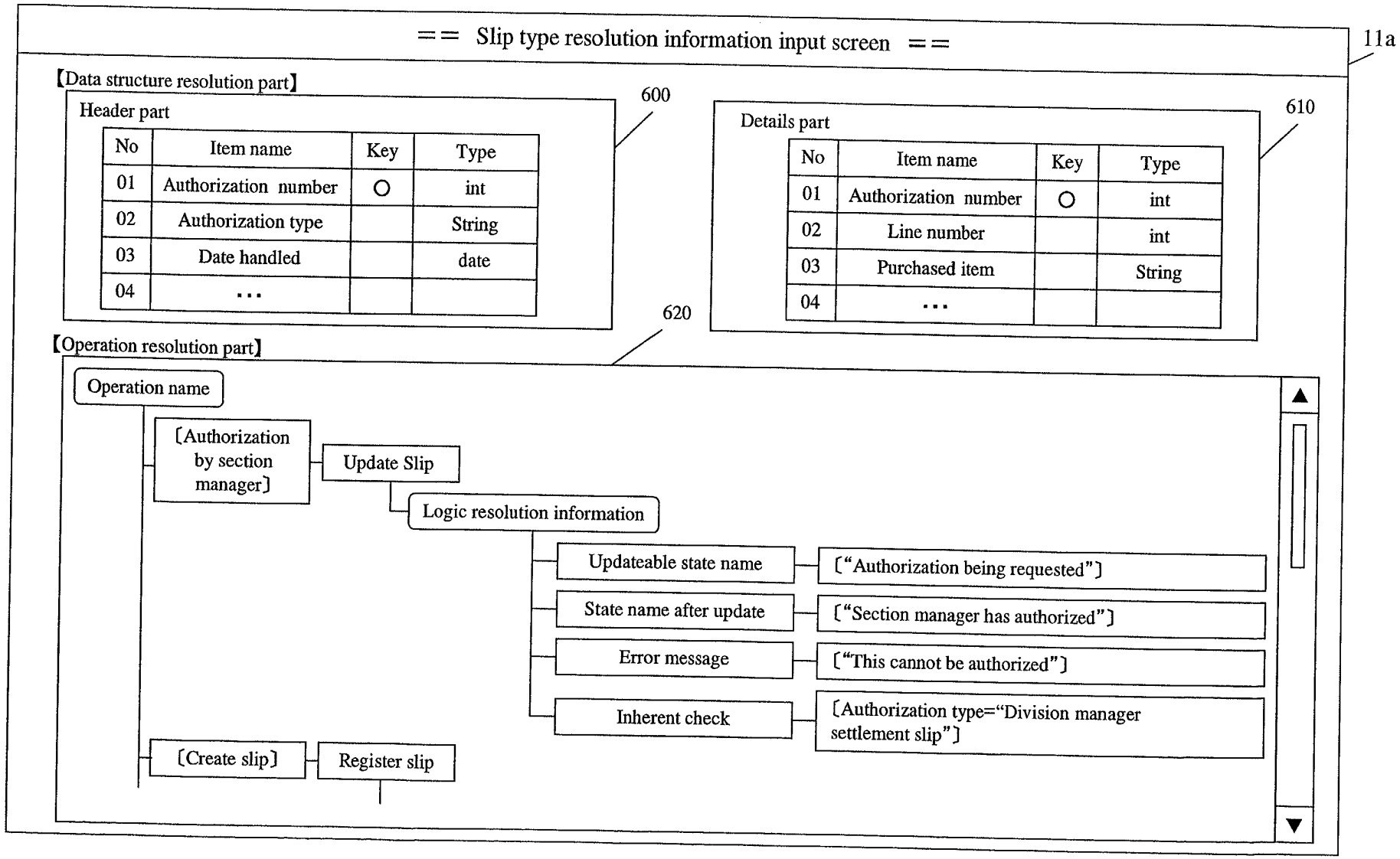

== Slip type resolution information input screen ==
11a
【Data structure resolution part】
Header part
600
No | Item name | Key | Type
01 | Authorization number | ○ | int
02 | Authorization type | | String
03 | Date handled | | date
04 | ... | | |
Details part
610
No | Item name | Key | Type
01 | Authorization number | ○ | int
02 | Line number | | int
03 | Purchased item | | String
04 | ... | | |
620
【Operation resolution part】
Operation name
〔Authorization by section manager〕
Update Slip
Logic resolution information
Updateable state name
〔"Authorization being requested"〕
State name after update
〔"Section manager has authorized"〕
Error message
〔"This cannot be authorized"〕
Inherent check
〔Authorization type="Division manager settlement slip"〕
〔Create slip〕
Register slip

Fig.7

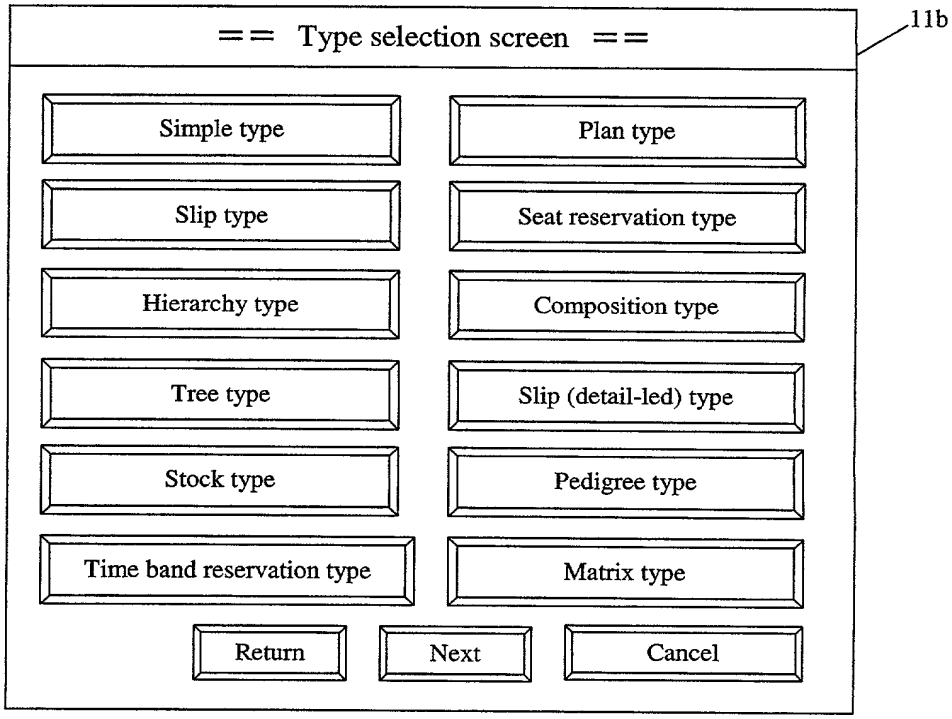

== Type selection screen ==
11b
Simple type
Plan type
Slip type
Seat reservation type
Hierarchy type
Composition type
Tree type
Slip (detail-led) type
Stock type
Pedigree type
Time band reservation type
Matrix type
Return
Next
Cancel

Fig.8

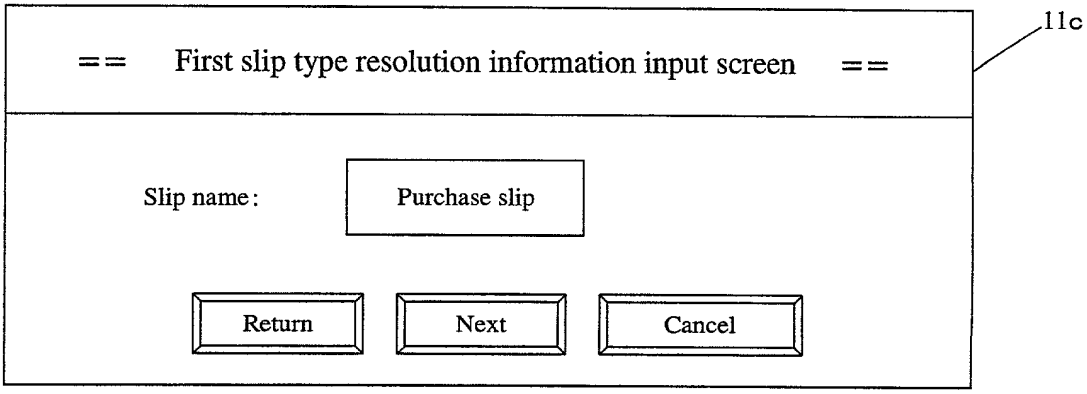
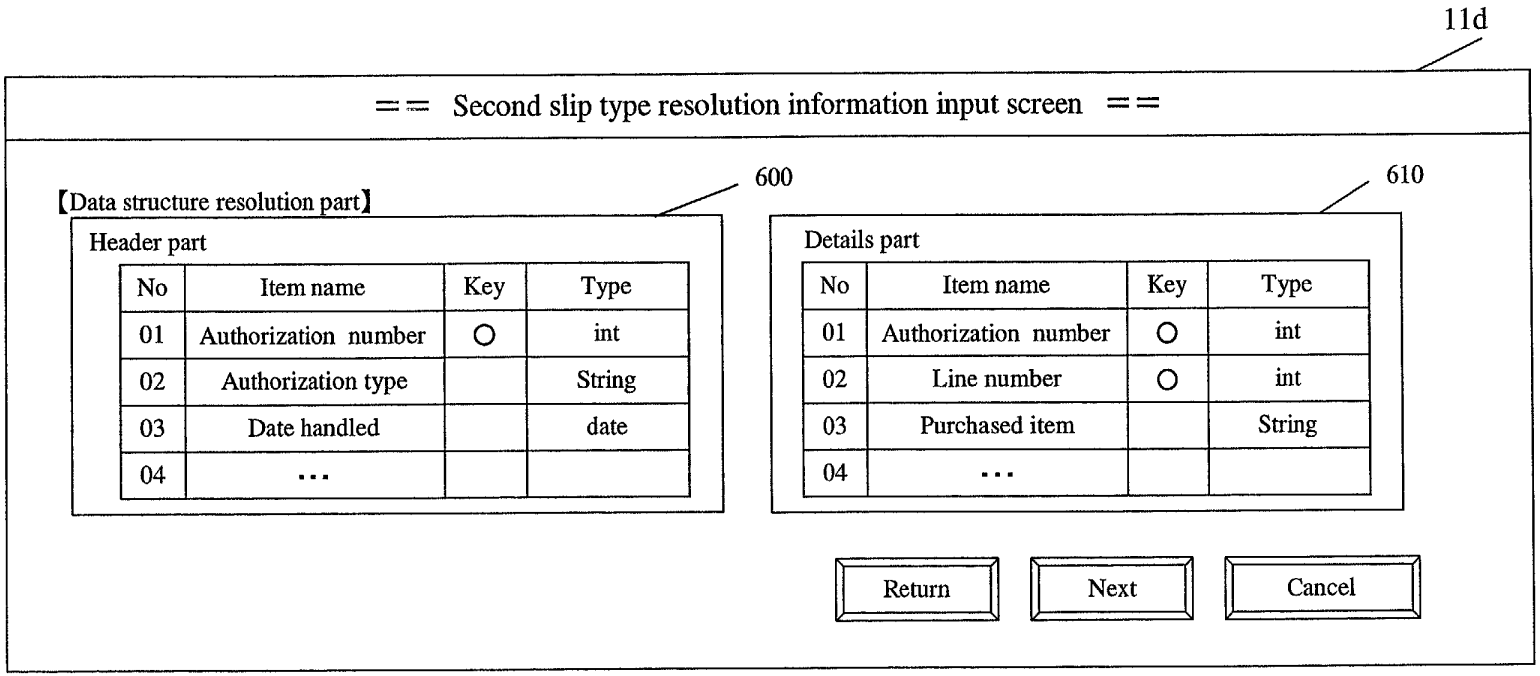

== First slip type resolution information input screen ==
11c
Slip name:
Purchase slip
Return
Next
Cancel

Fig.9



No	Item name	Key	Type
01	Authorization number	○	int
02	Authorization type		String
03	Date handled		date
04	...		

No	Item name	Key	Type
01	Authorization number	○	int
02	Line number	○	int
03	Purchased item		String
04	...		

Fig.10

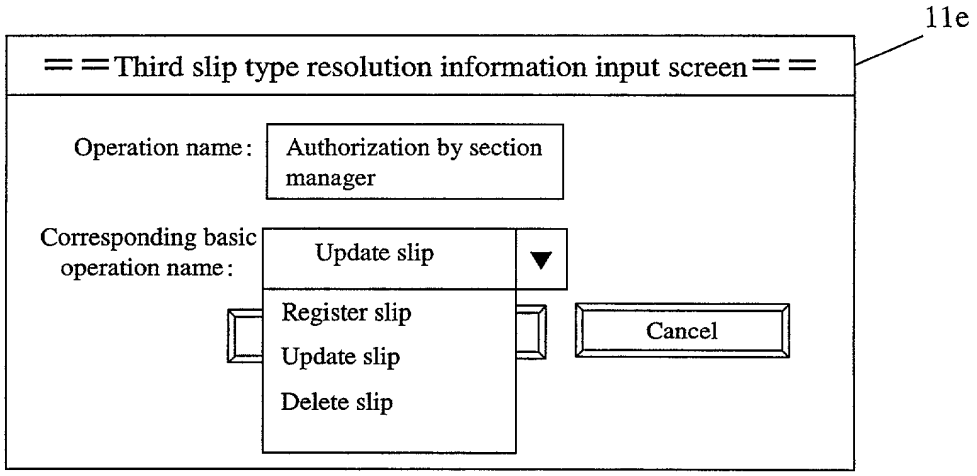

11e
==Third slip type resolution information input screen==
Operation name:
Authorization by section manager
Corresponding basic operation name:
Update slip
Register slip
Update slip
Delete slip
Cancel

Fig.11

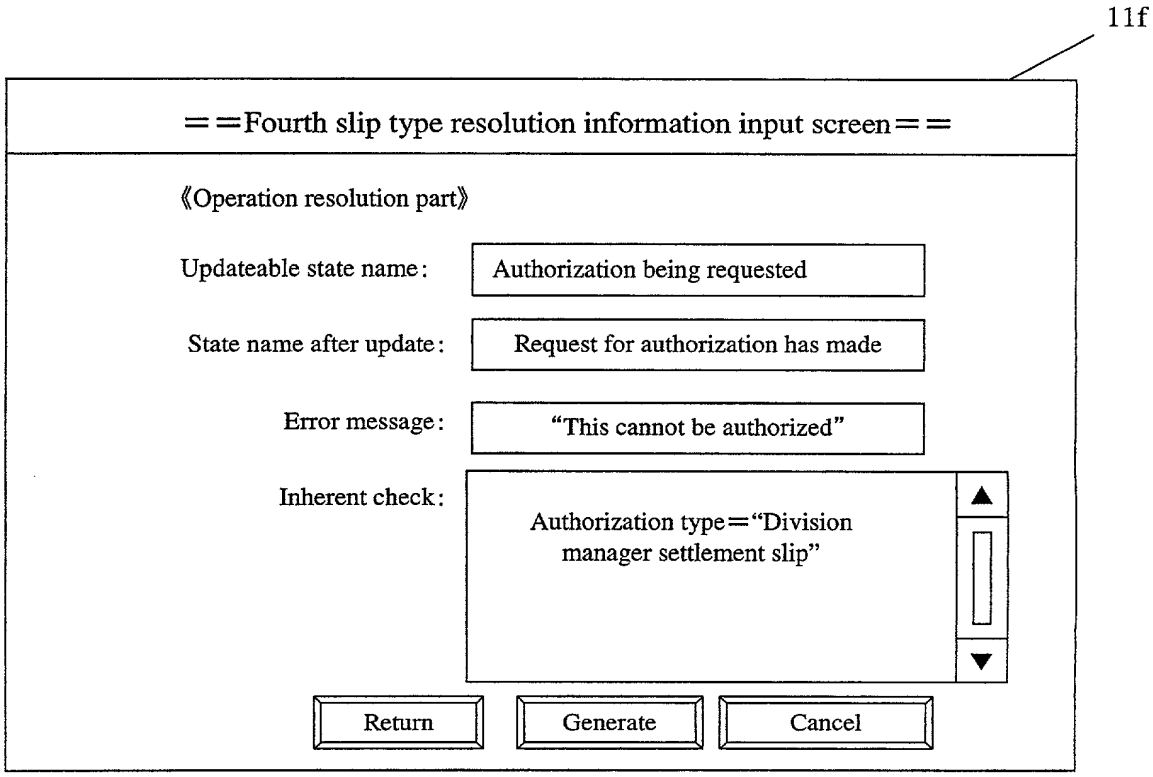

11f
==Fourth slip type resolution information input screen==
《Operation resolution part》
Updateable state name:
Authorization being requested
State name after update:
Request for authorization has made
Error message:
"This cannot be authorized"
Inherent check:
Authorization type="Division manager settlement slip"
Return
Generate
Cancel

Fig.12

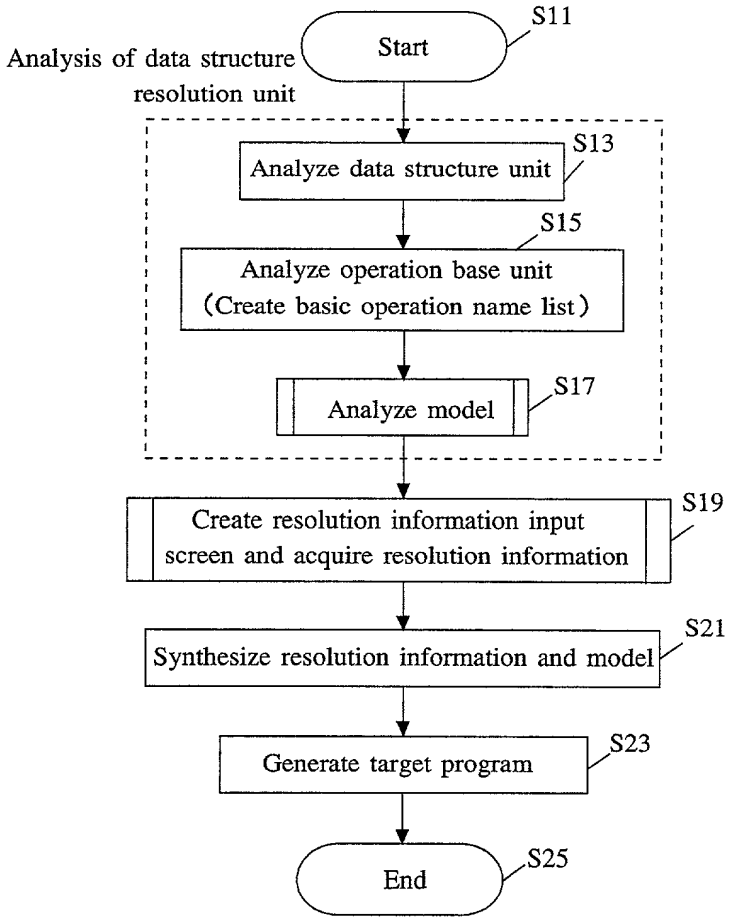

Analysis of data structure resolution unit
Start
S11
Analyze data structure unit
S13
Analyze operation base unit (Create basic operation name list)
S15
Analyze model
S17
Create resolution information input screen and acquire resolution information
S19
Synthesize resolution information and model
S21
Generate target program
S23
End
S25

Fig.13

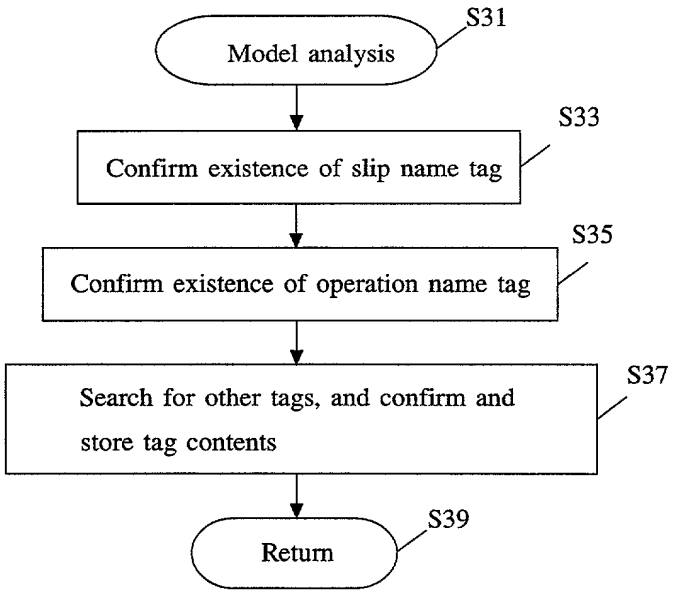

S31
Model analysis
S33
Confirm existence of slip name tag
S35
Confirm existence of operation name tag
S37
Search for other tags, and confirm and store tag contents
S39
Return

Fig.14

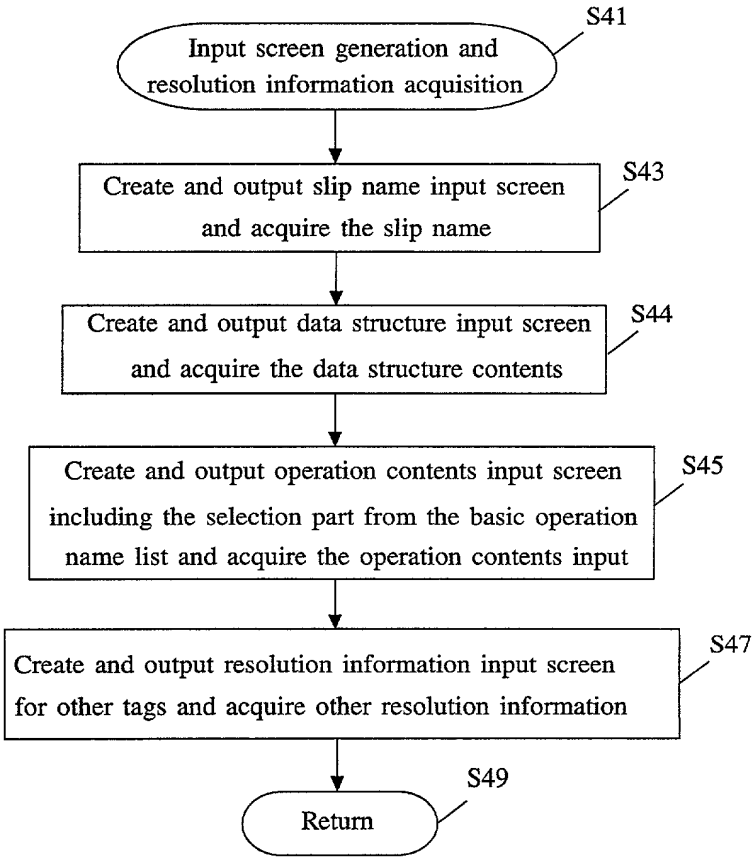

S41
Input screen generation and resolution information acquisition
S43
Create and output slip name input screen and acquire the slip name
S44
Create and output data structure input screen and acquire the data structure contents
S45
Create and output operation contents input screen including the selection part from the basic operation name list and acquire the operation contents input
S47
Create and output resolution information input screen for other tags and acquire other resolution information
S49
Return

Fig.15

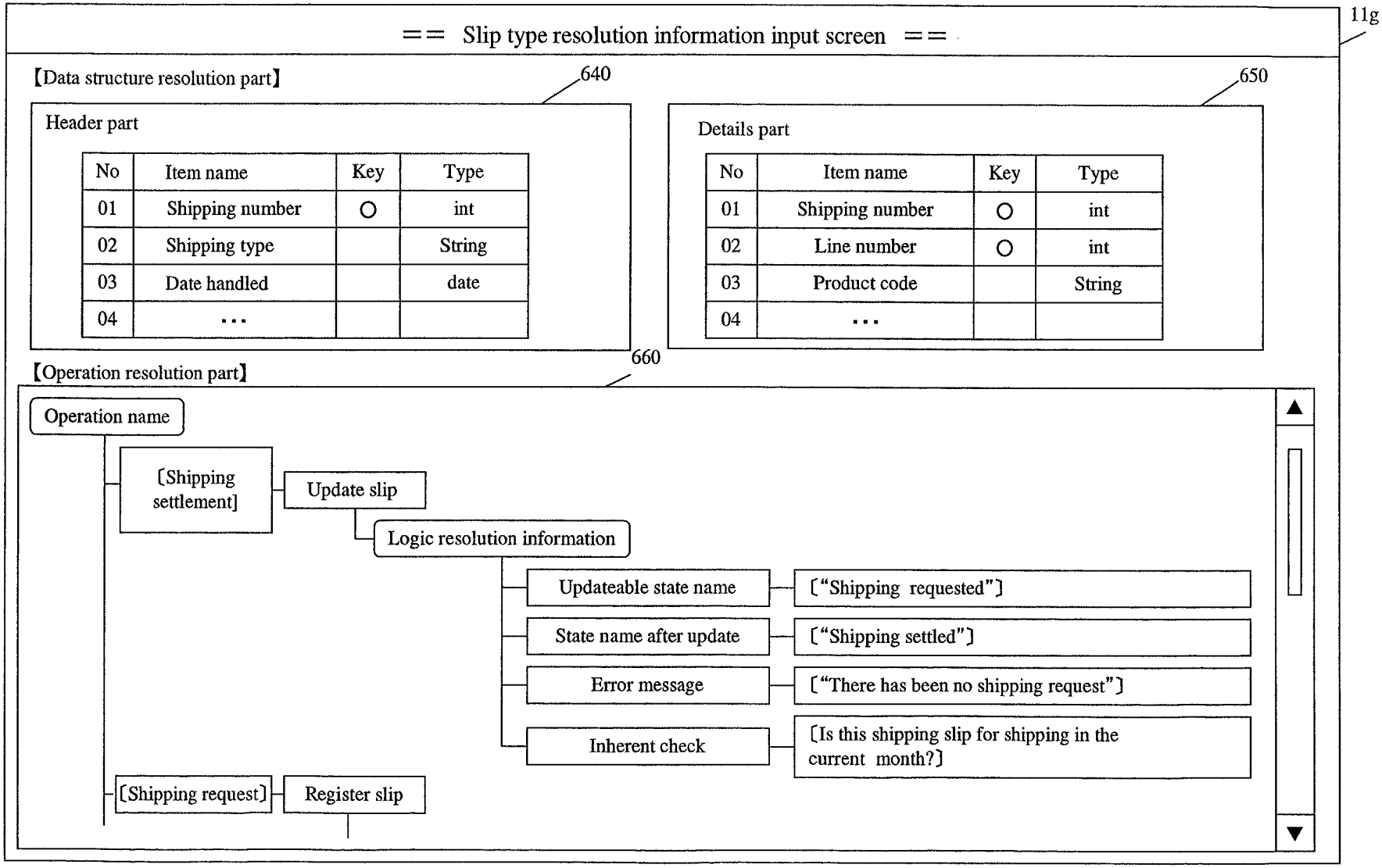

11g
== Slip type resolution information input screen ==
【Data structure resolution part】
640
650
Header part
No | Item name | Key | Type
01 | Shipping number | ○ | int
02 | Shipping type | | String
03 | Date handled | | date
04 | ・・・ | | |
Details part
No | Item name | Key | Type
01 | Shipping number | ○ | int
02 | Line number | ○ | int
03 | Product code | | String
04 | ・・・ | | |
660
【Operation resolution part】
Operation name
〔Shipping settlement〕
Update slip
Logic resolution information
Updateable state name
〔"Shipping requested"〕
State name after update
〔"Shipping settled"〕
Error message
〔"There has been no shipping request"〕
Inherent check
〔Is this shipping slip for shipping in the current month?〕
〔Shipping request〕
Register slip

Fig.16

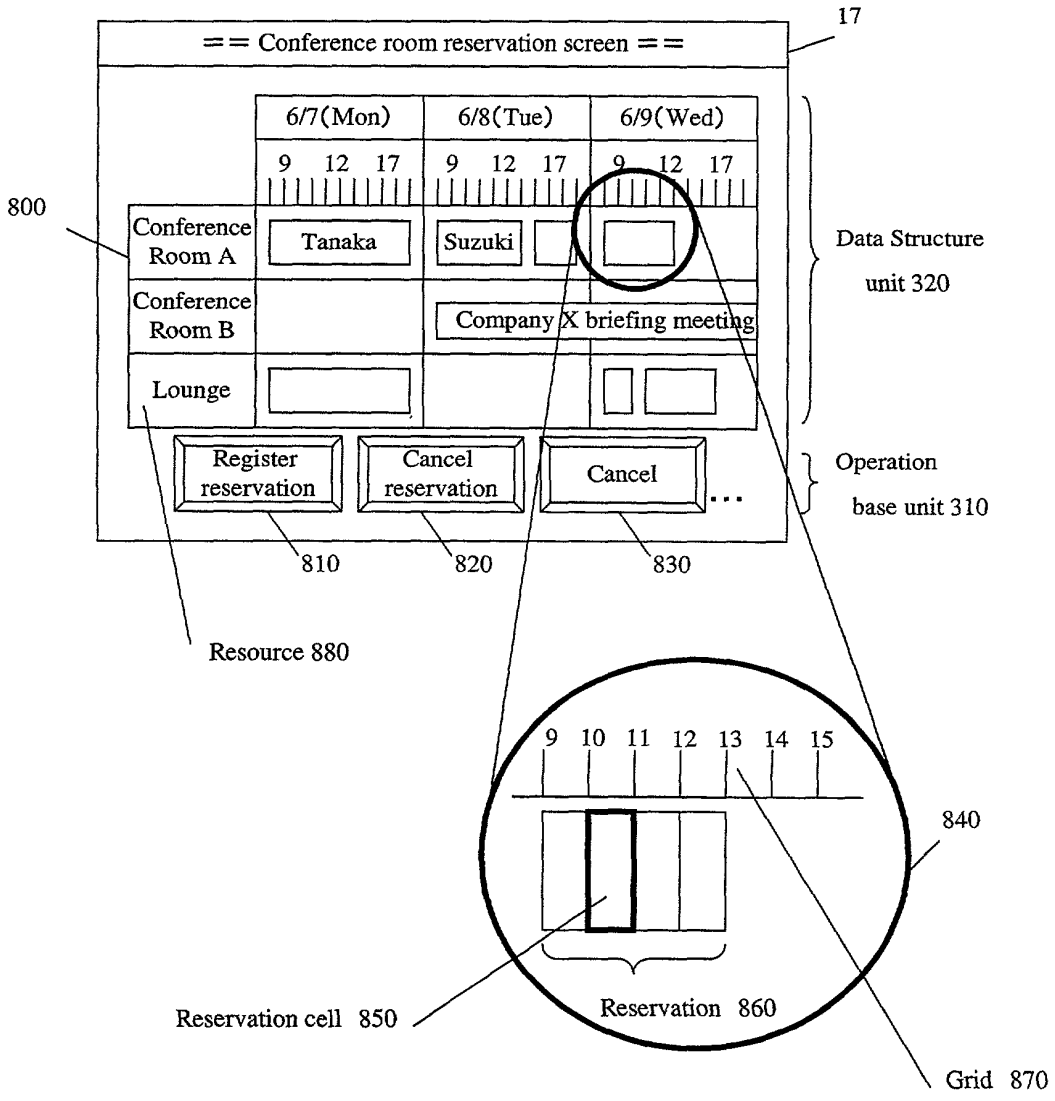

== Conference room reservation screen ==
17
6/7(Mon)
6/8(Tue)
6/9(Wed)
9 12 17
9 12 17
9 12 17
800
Conference Room A
Tanaka
Suzuki
Conference Room B
Company X briefing meeting
Lounge
Data Structure unit 320
Register reservation
Cancel reservation
Cancel
Operation base unit 310
810
820
830
Resource 880
9 10 11 12 13 14 15
840
Reservation cell 850
Reservation 860
Grid 870

Fig.17

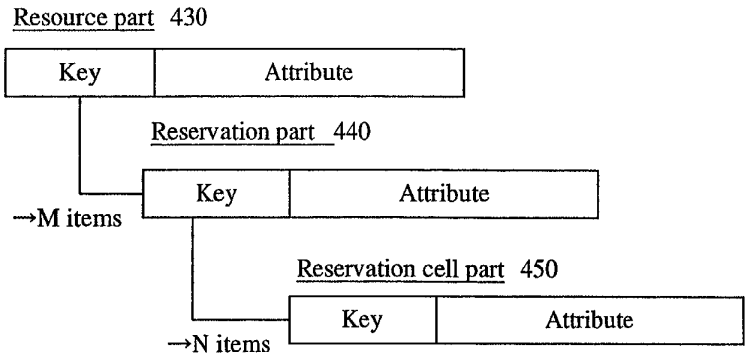


Fig.18

	Resource part	Reservation part	Reservation cell part
Register reservation	Register	Register	Register
Cancel reservation	Delete	Delete	Delete
Confirm vacant status	–	Search	–
Change reserved period	–	Update	Delete/Register
Change reserved resource	Search	Update	Delete/Register
Search by reservation condition	–	Search	–
...	...	...	...

Fig.19

11i

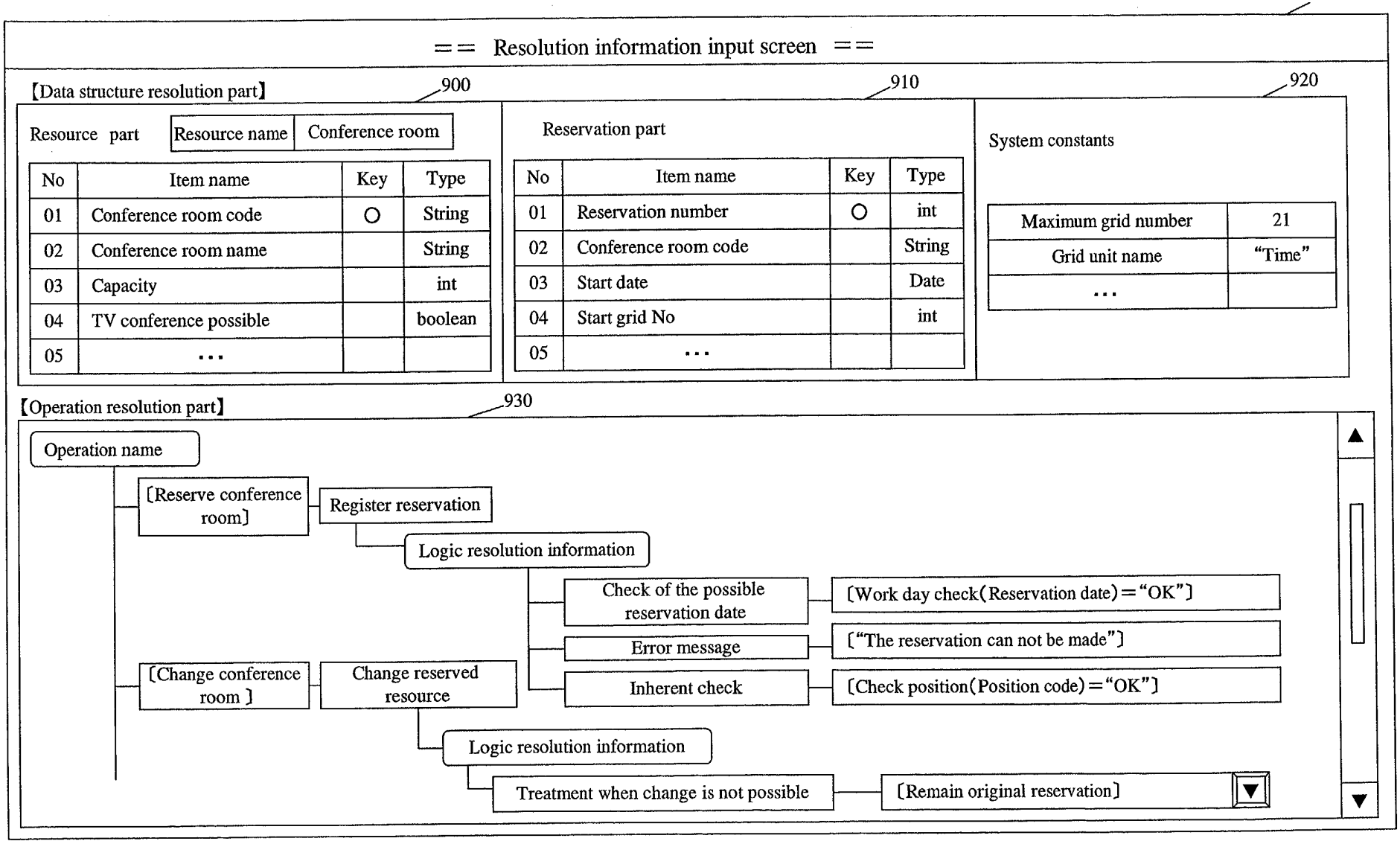

== Resolution information input screen ==
【Data structure resolution part】
900
910
920
Resource part
Resource name
Conference room
No
Item name
Key
Type
01
Conference room code
○
String
02
Conference room name
String
03
Capacity
int
04
TV conference possible
boolean
05
...
Reservation part
No
Item name
Key
Type
01
Reservation number
○
int
02
Conference room code
String
03
Start date
Date
04
Start grid No
int
05
...
System constants
Maximum grid number
21
Grid unit name
"Time"
...
【Operation resolution part】
930
Operation name
〔Reserve conference room〕
Register reservation
Logic resolution information
Check of the possible reservation date
〔Work day check(Reservation date)="OK"〕
Error message
〔"The reservation can not be made"〕
Inherent check
〔Check position(Position code)="OK"〕
〔Change conference room〕
Change reserved resource
Logic resolution information
Treatment when change is not possible
〔Remain original reservation〕

Fig.20

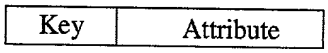


Fig.21

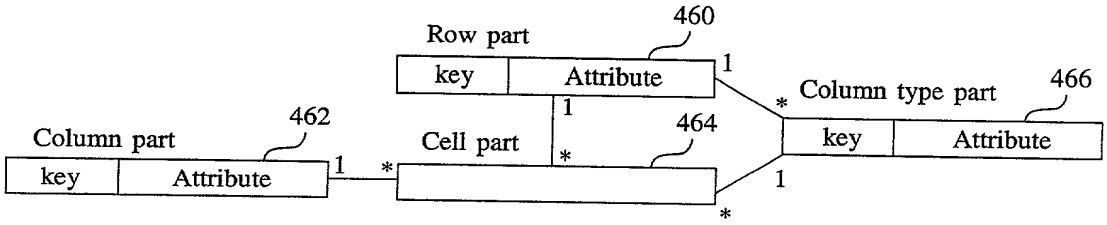


Fig.22

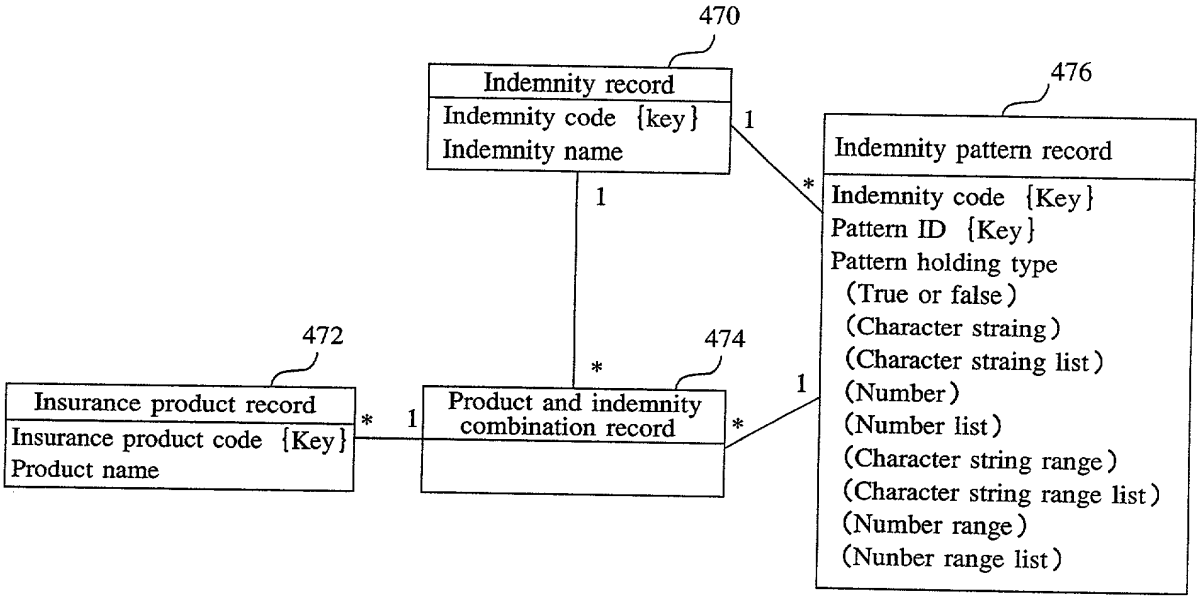


Fig.24

Insurance / Product indemnity	Use and model	Special non-discharge agreement by age	Special family bike contract	Uninsured party injury insurance
A	· Ordinary private vehicle · Small private vehicle · Light private vehicle · Two-wheeled vehicle · Motorized bicycle	· 21 years · 26 years · 30 years · Age irrelevant	Yes	Yes
B	· Ordinary private vehicle · Small private vehicle · Light private vehicle	· 21 years · 26 years · 30 years · Age irrelevant	Yes	Yes
C	· Ordinary private vehicle · Small private vehicle · Light private vehicle	· 21 years · 26 years · 30 years · Age irrelevant	Yes	Yes
D	· Ordinary private vehicle · Small private vehicle · Light private vehicle	· 21 years · 26 years · 30 years · Age irrelevant	No	No
E	· Ordinary praivate vehicle · Small private vehicle · Light private vehicle · Two-wheeled vehicle · Motorized bicycle	· 50 years	No	No

Fig.23

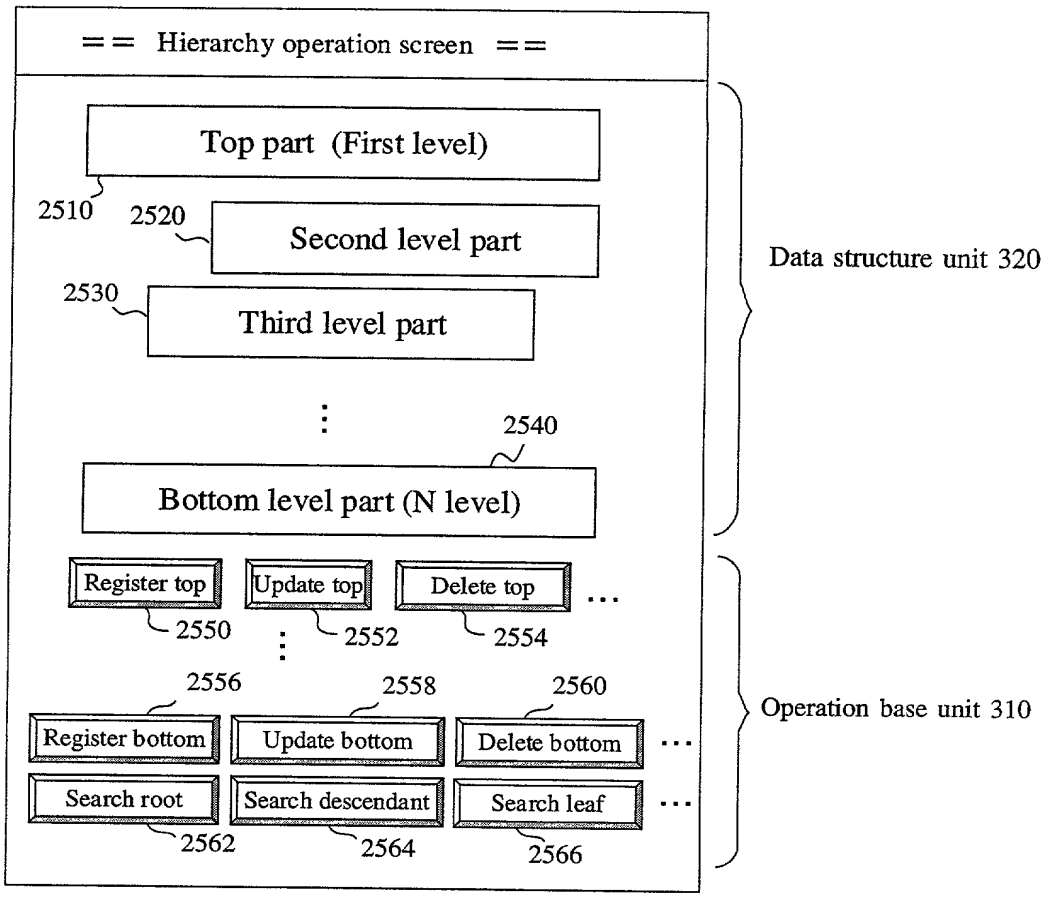

== Hierarchy operation screen ==
Top part (First level)
2510
2520
Second level part
2530
Third level part
2540
Bottom level part (N level)
Data structure unit 320
Register top
Update top
Delete top
2550
2552
2554
2556
2558
2560
Register bottom
Update bottom
Delete bottom
Search root
Search descendant
Search leaf
2562
2564
2566
Operation base unit 310

Fig.25

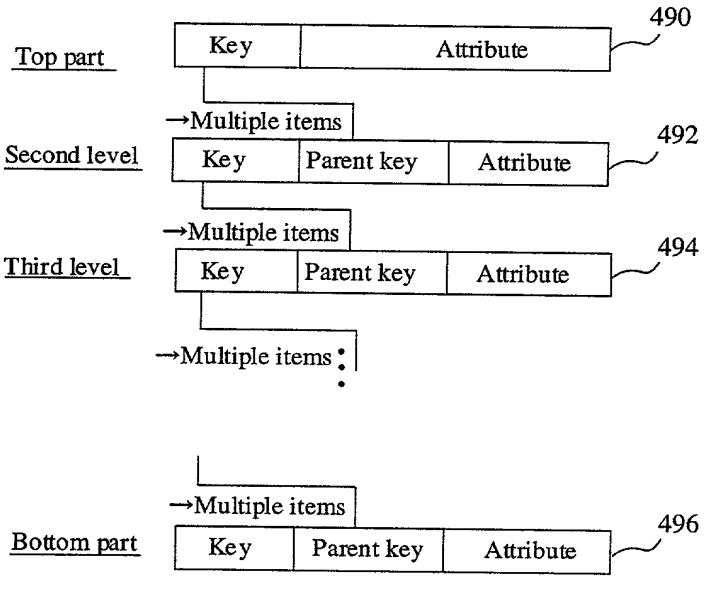

Top part
Key
Attribute
490
→Multiple items
Second level
Key
Parent key
Attribute
492
→Multiple items
Third level
Key
Parent key
Attribute
494
→Multiple items
→Multiple items
Bottom part
Key
Parent key
Attribute
496

Fig.26

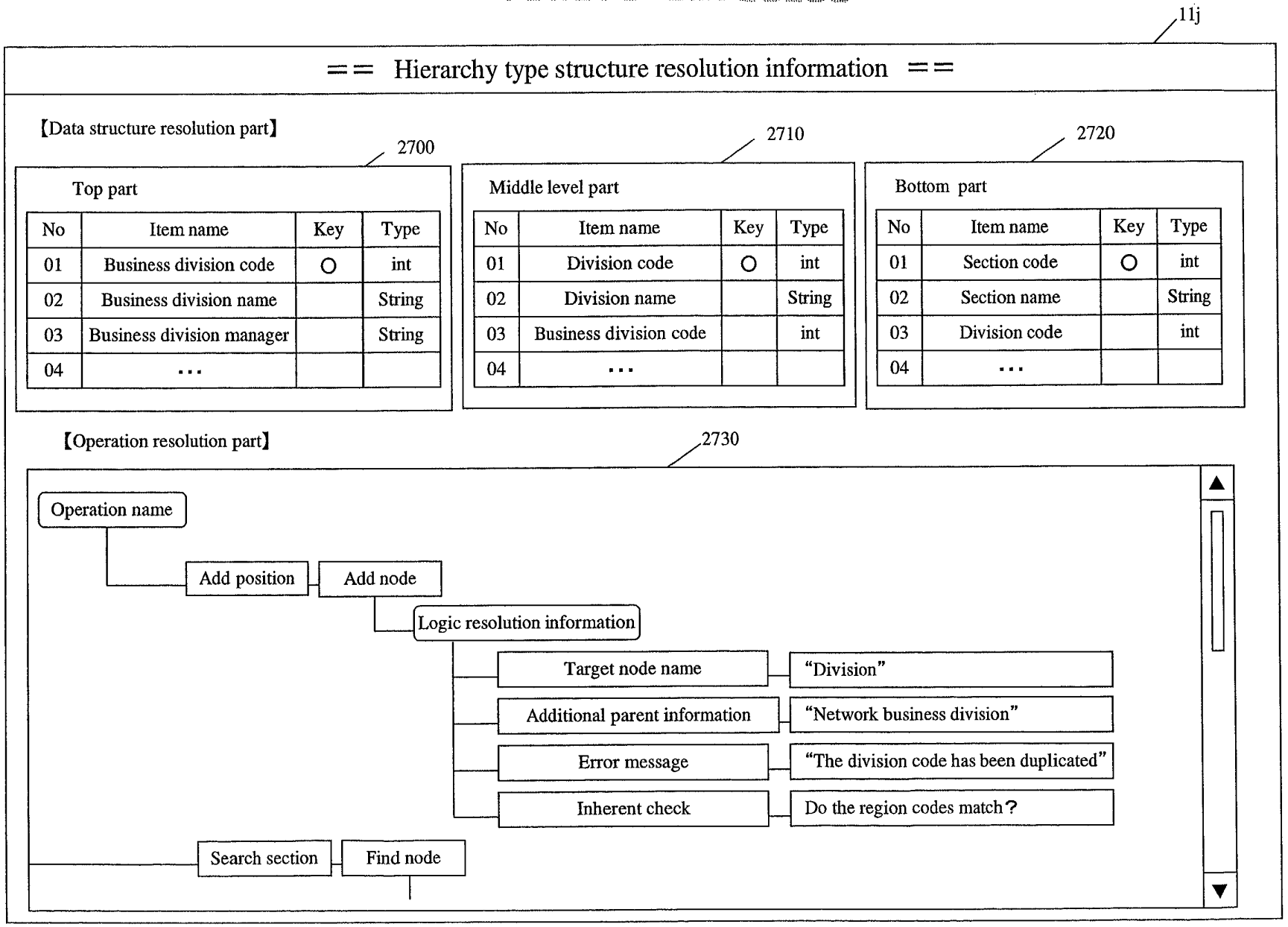

11j
== Hierarchy type structure resolution information ==
【Data structure resolution part】
2700
Top part
No | Item name | Key | Type
01 | Business division code | O | int
02 | Business division name | | String
03 | Business division manager | | String
04 | ... | | |
2710
Middle level part
No | Item name | Key | Type
01 | Division code | O | int
02 | Division name | | String
03 | Business division code | | int
04 | ... | | |
2720
Bottom part
No | Item name | Key | Type
01 | Section code | O | int
02 | Section name | | String
03 | Division code | | int
04 | ... | | |
【Operation resolution part】
2730
Operation name
Add position
Add node
Logic resolution information
Target node name
"Division"
Additional parent information
"Network business division"
Error message
"The division code has been duplicated"
Inherent check
Do the region codes match?
Search section
Find node

Fig.27

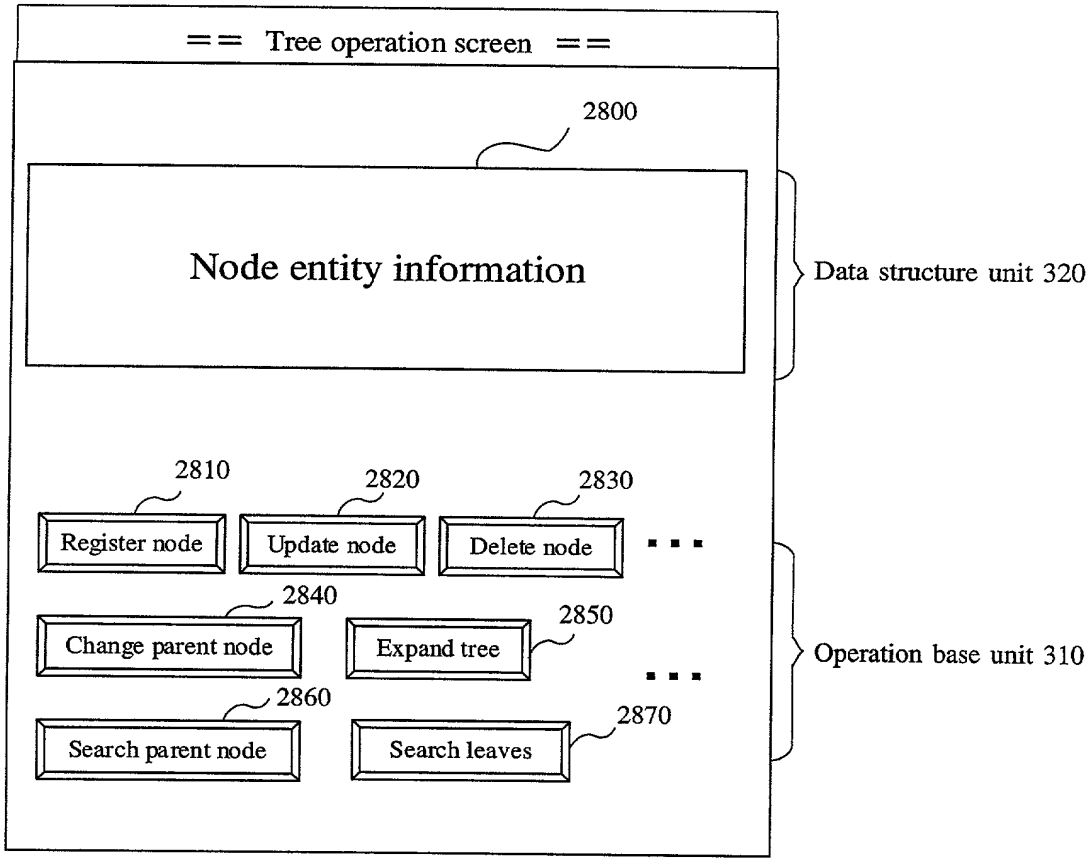

== Tree operation screen ==
2800
Node entity information
Data structure unit 320
2810
2820
2830
Register node
Update node
Delete node
2840
2850
Change parent node
Expand tree
Operation base unit 310
2860
2870
Search parent node
Search leaves

Fig.28

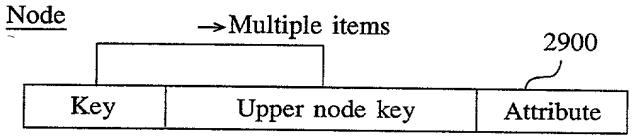

Node
→Multiple items
2900
Key
Upper node key
Attribute

Fig.29

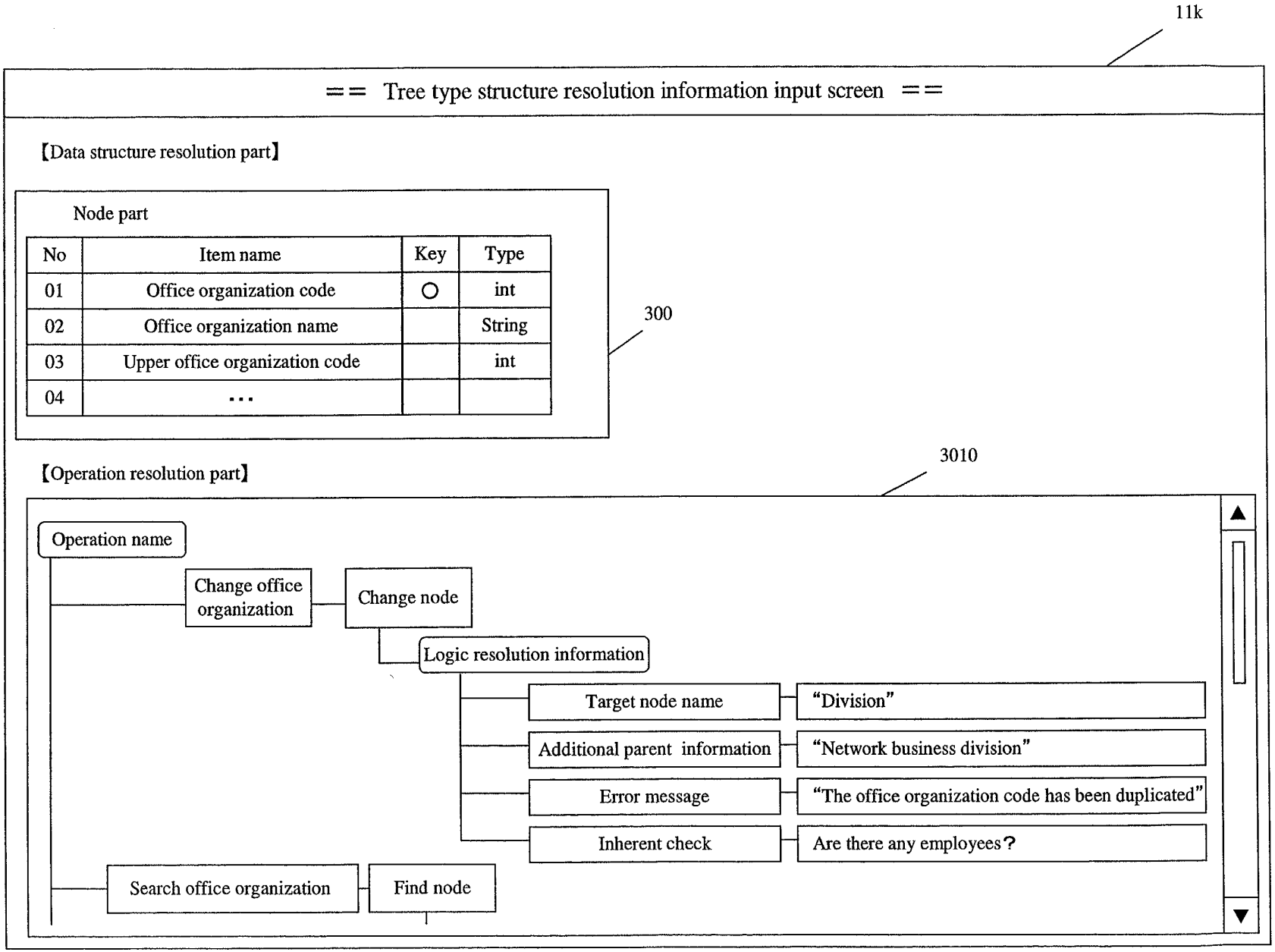

11k
== Tree type structure resolution information input screen ==
【Data structure resolution part】
Node part
No | Item name | Key | Type
01 | Office organization code | ○ | int
02 | Office organization name | | String
03 | Upper office organization code | | int
04 | ・・・ | | |
300
【Operation resolution part】
3010
Operation name
Change office organization
Change node
Logic resolution information
Target node name
"Division"
Additional parent information
"Network business division"
Error message
"The office organization code has been duplicated"
Inherent check
Are there any employees?
Search office organization
Find node

Fig.30

Fig.31a

Sales slip			
Sale number	Date order issued	Client name	Total
101	2/14/00	Merchant A	22000

Fig.31b

Invoice slip			
Invoice number	Invoice date	Invoiced to	Total
201	2/29/00	Merchant A	17000

Fig.31c

Receipt slip			
Receipt number	Invoice date	Invoiced to	Total
301	2/29/00	Merchant A	17000

Fig.31d

Transaction details				
Detail number	Product	Quantity	Unit price	Price
1001	Ball point pen	100	100	10000
1002	Correction fluid	10	200	2000
1003	Pencil	100	50	5000
1004	Eraser	50	100	5000

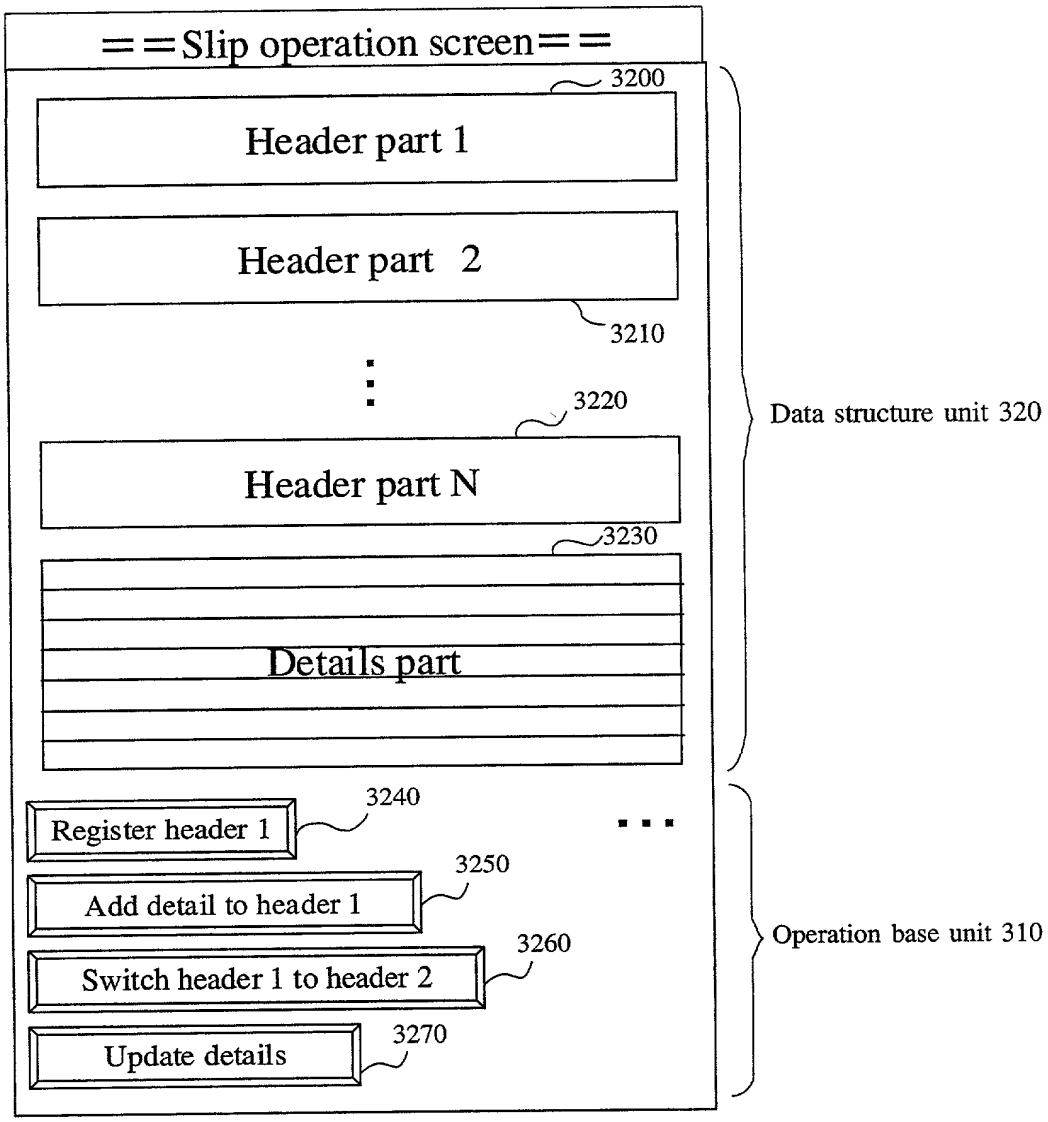

==Slip operation screen==
3200
Header part 1
Header part 2
3210
3220
Header part N
3230
Details part
Data structure unit 320
3240
Register header 1
3250
Add detail to header 1
3260
Switch header 1 to header 2
3270
Update details
Operation base unit 310

Fig.32

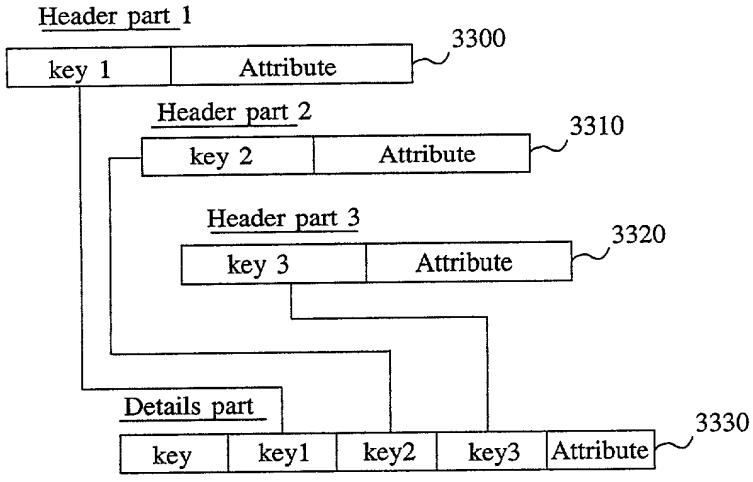

Header part 1
key 1
Attribute
3300
Header part 2
key 2
Attribute
3310
Header part 3
key 3
Attribute
3320
Details part
key
key1
key2
key3
Attribute
3330

Fig.33

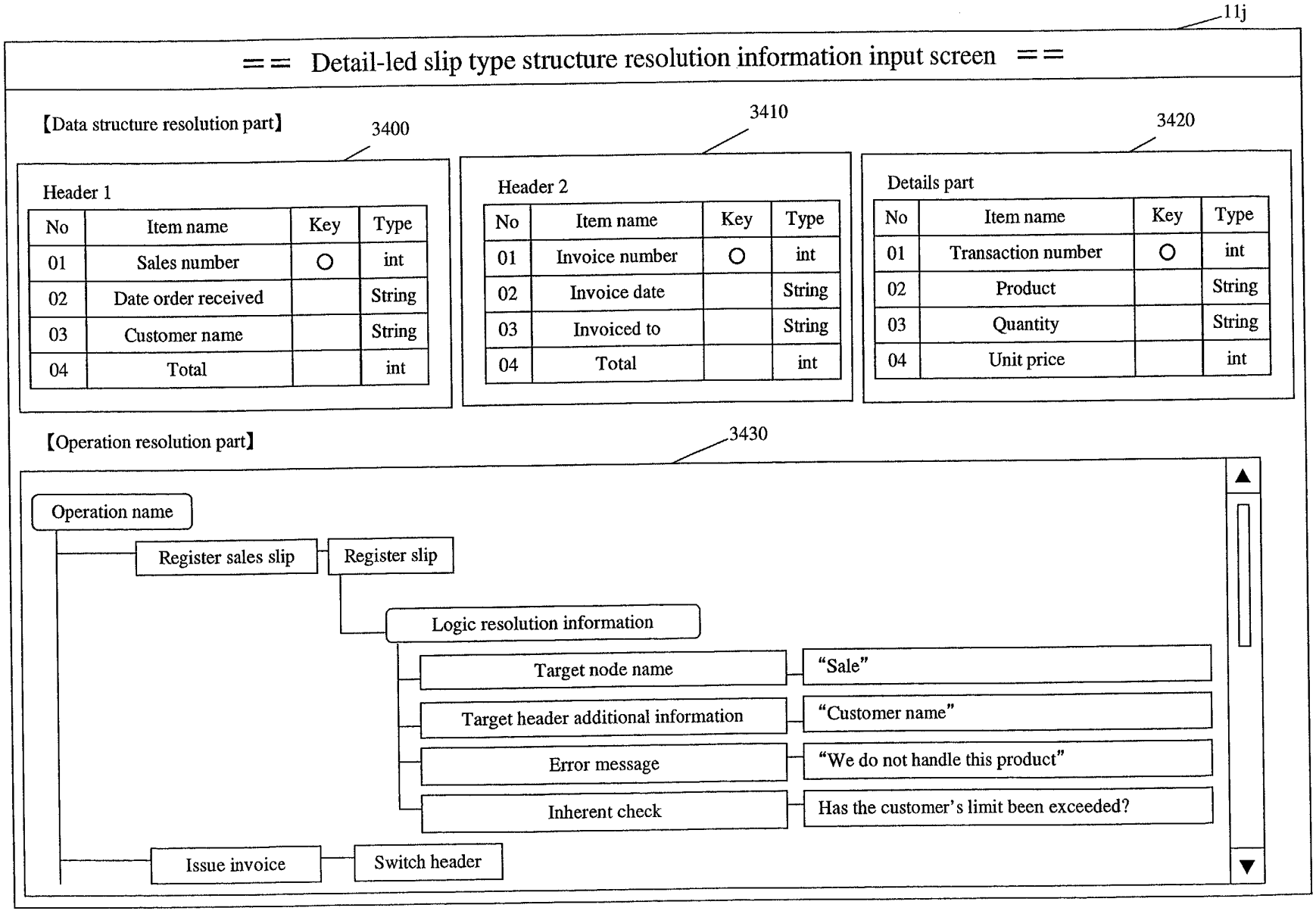

11j
== Detail-led slip type structure resolution information input screen ==
【Data structure resolution part】
3400
Header 1
No | Item name | Key | Type
01 | Sales number | ○ | int
02 | Date order received | | String
03 | Customer name | | String
04 | Total | | int
3410
Header 2
No | Item name | Key | Type
01 | Invoice number | ○ | int
02 | Invoice date | | String
03 | Invoiced to | | String
04 | Total | | int
3420
Details part
No | Item name | Key | Type
01 | Transaction number | ○ | int
02 | Product | | String
03 | Quantity | | String
04 | Unit price | | int
【Operation resolution part】
3430
Operation name
Register sales slip
Register slip
Logic resolution information
Target node name
"Sale"
Target header additional information
"Customer name"
Error message
"We do not handle this product"
Inherent check
Has the customer's limit been exceeded?
Issue invoice
Switch header

Fig.34

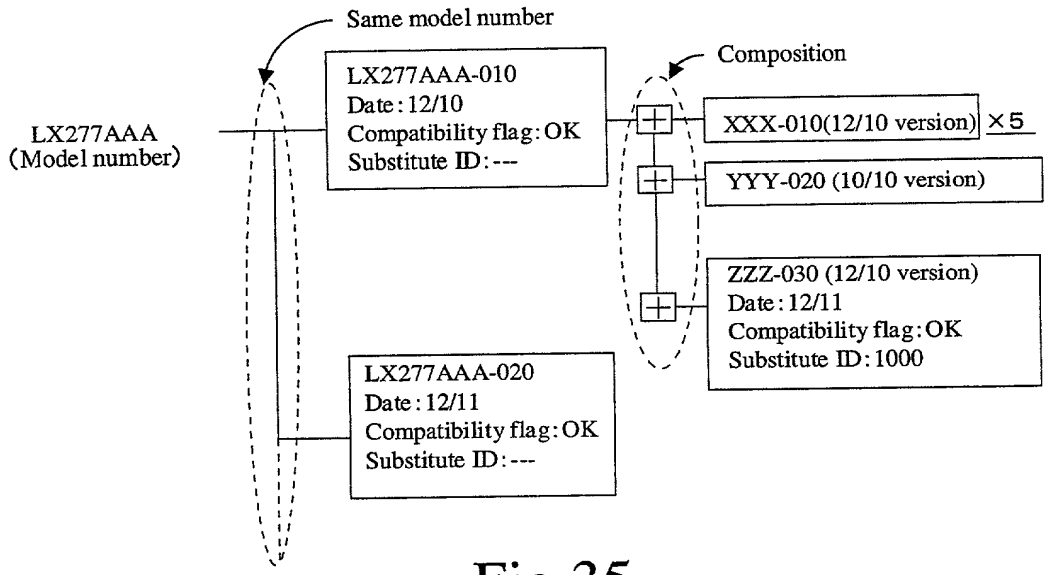

Same model number
Composition
LX277AAA
(Model number)
LX277AAA-010
Date: 12/10
Compatibility flag: OK
Substitute ID: ---
XXX-010(12/10 version)
×5
YYY-020 (10/10 version)
ZZZ-030 (12/10 version)
Date: 12/11
Compatibility flag: OK
Substitute ID: 1000
LX277AAA-020
Date: 12/11
Compatibility flag: OK
Substitute ID: ---

Fig.35

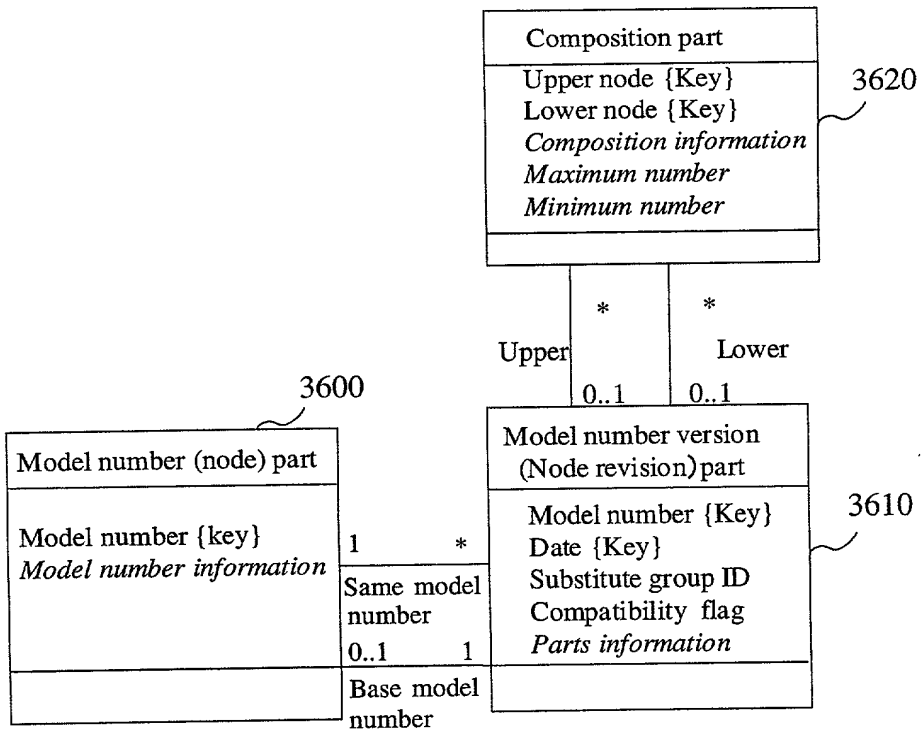

Composition part
Upper node {Key}
Lower node {Key}
Composition information
Maximum number
Minimum number
3620
*
*
Upper
Lower
0..1
0..1
3600
Model number (node) part
Model number {key}
Model number information
1
*
Same model number
0..1
1
Base model number
Model number version (Node revision) part
Model number {Key}
Date {Key}
Substitute group ID
Compatibility flag
Parts information
3610

Fig.36

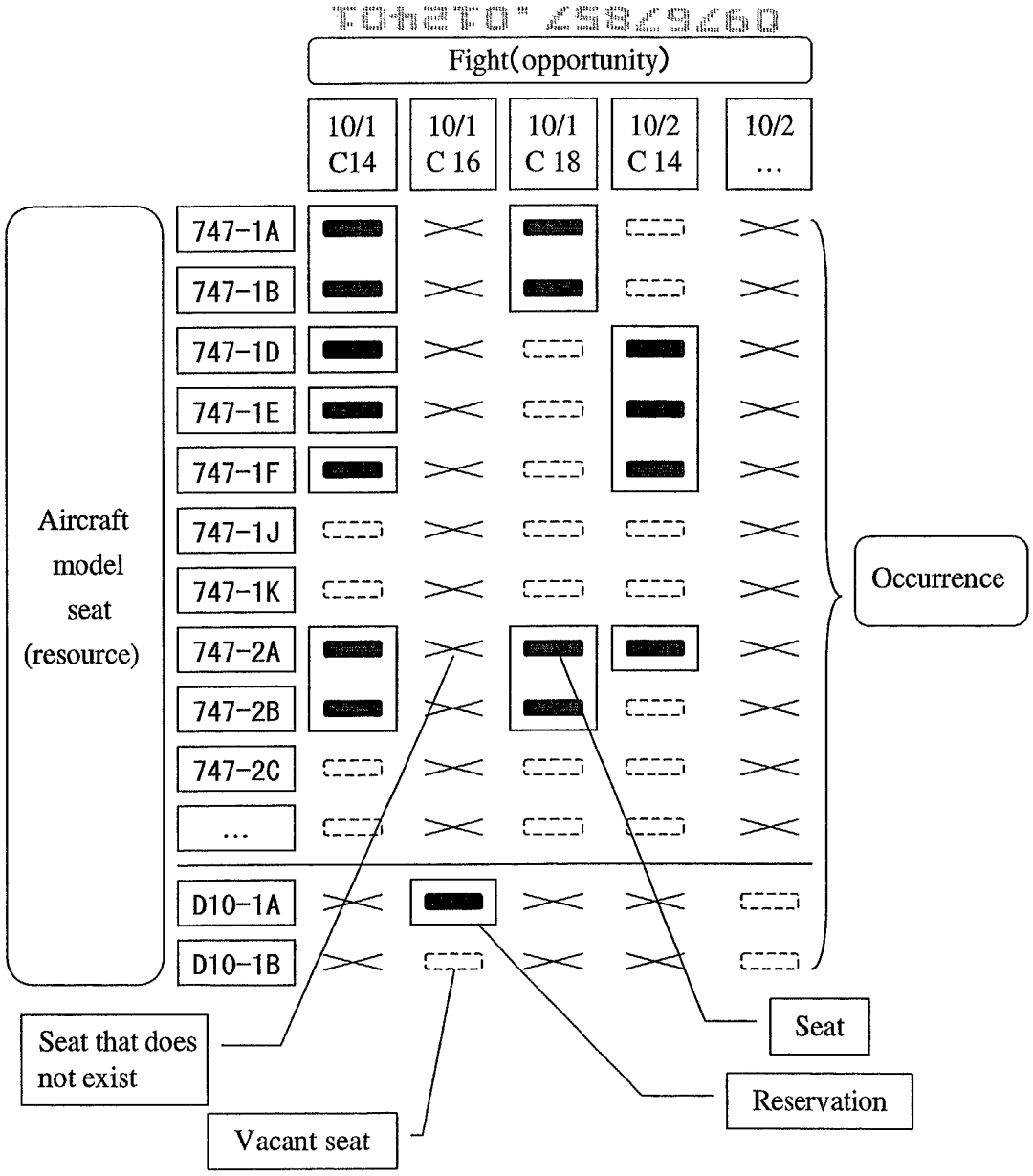

Fight(opportunity)
10/1 C14
10/1 C 16
10/1 C 18
10/2 C 14
10/2 ...
Aircraft model seat (resource)
747-1A
747-1B
747-1D
747-1E
747-1F
747-1J
747-1K
747-2A
747-2B
747-2C
...
D10-1A
D10-1B
Occurrence
Seat that does not exist
Vacant seat
Seat
Reservation

Fig.37

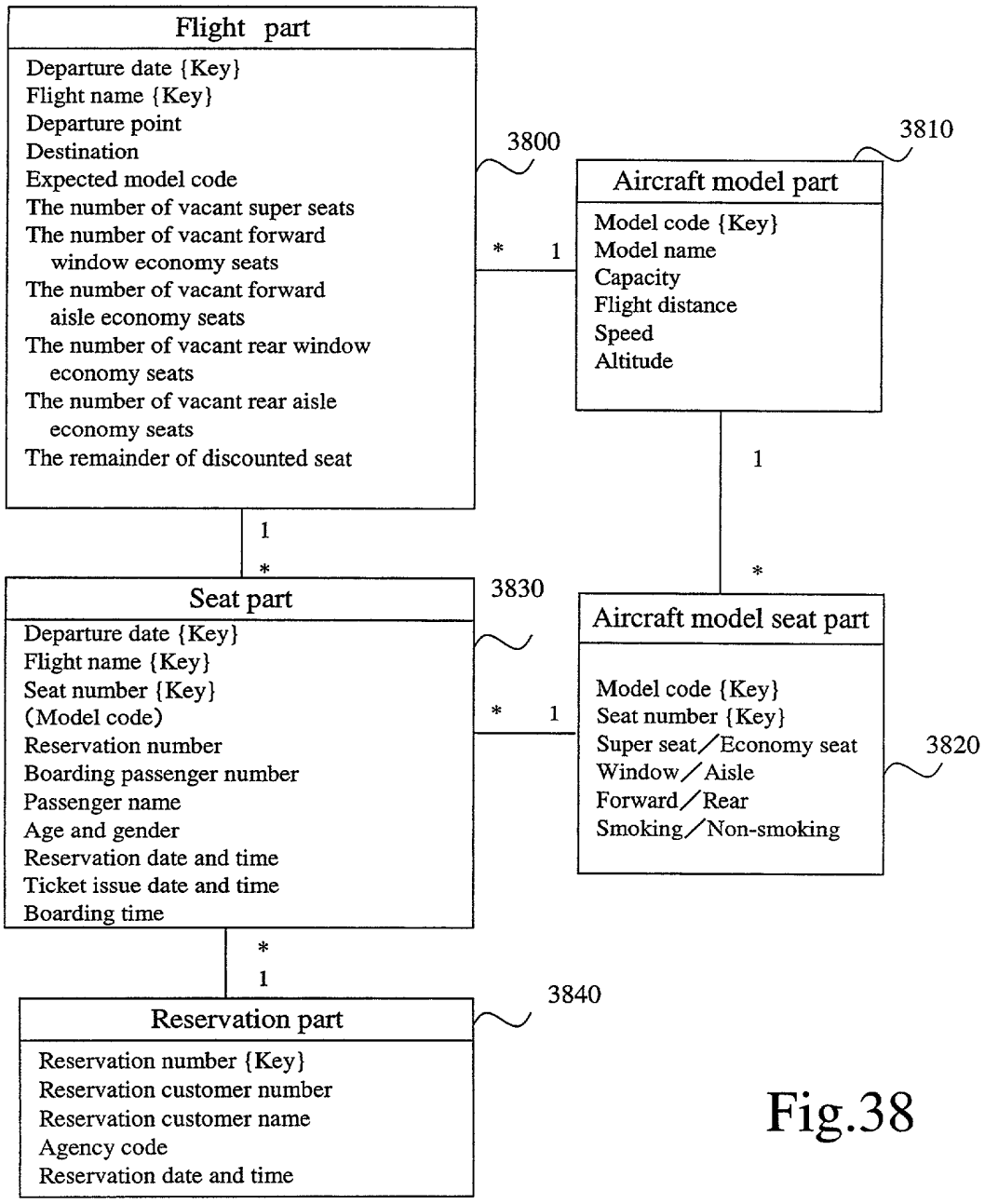

Flight part
Departure date {Key}
Flight name {Key}
Departure point
Destination
Expected model code
The number of vacant super seats
The number of vacant forward window economy seats
The number of vacant forward aisle economy seats
The number of vacant rear window economy seats
The number of vacant rear aisle economy seats
The remainder of discounted seat
3800
3810
Aircraft model part
Model code {Key}
Model name
Capacity
Flight distance
Speed
Altitude
* 1
1
*
1
*
Seat part
Departure date {Key}
Flight name {Key}
Seat number {Key}
(Model code)
Reservation number
Boarding passenger number
Passenger name
Age and gender
Reservation date and time
Ticket issue date and time
Boarding time
3830
Aircraft model seat part
Model code {Key}
Seat number {Key}
Super seat/Economy seat
Window/Aisle
Forward/Rear
Smoking/Non-smoking
3820
* 1
*
1
Reservation part
Reservation number {Key}
Reservation customer number
Reservation customer name
Agency code
Reservation date and time
3840

Fig.38

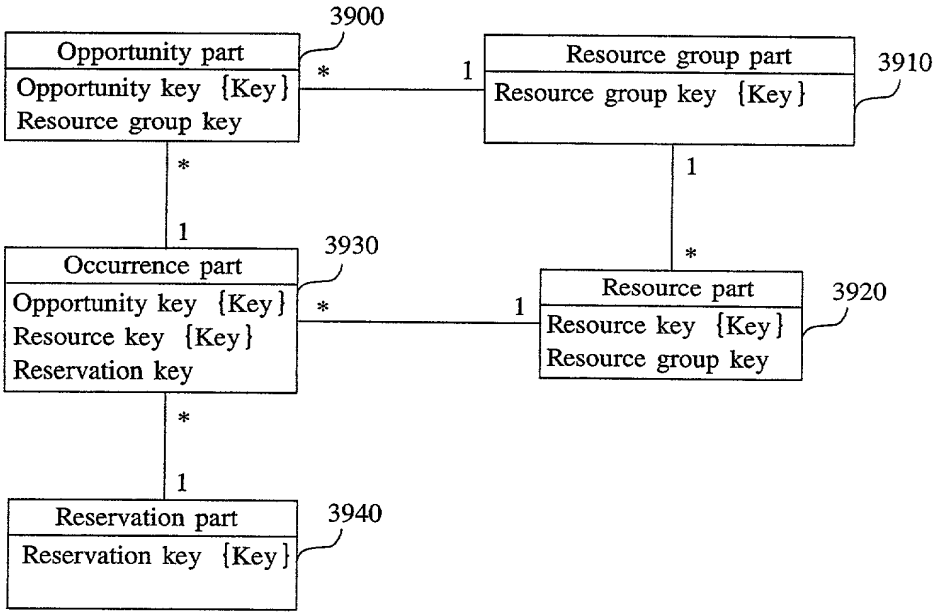

3900
Opportunity part
Opportunity key {Key}
Resource group key
*
1
Resource group part
Resource group key {Key}
3910
*
1
1
*
Occurrence part
Opportunity key {Key}
Resource key {Key}
Reservation key
3930
*
1
Resource part
Resource key {Key}
Resource group key
3920
*
1
Reservation part
Reservation key {Key}
3940

Fig.39

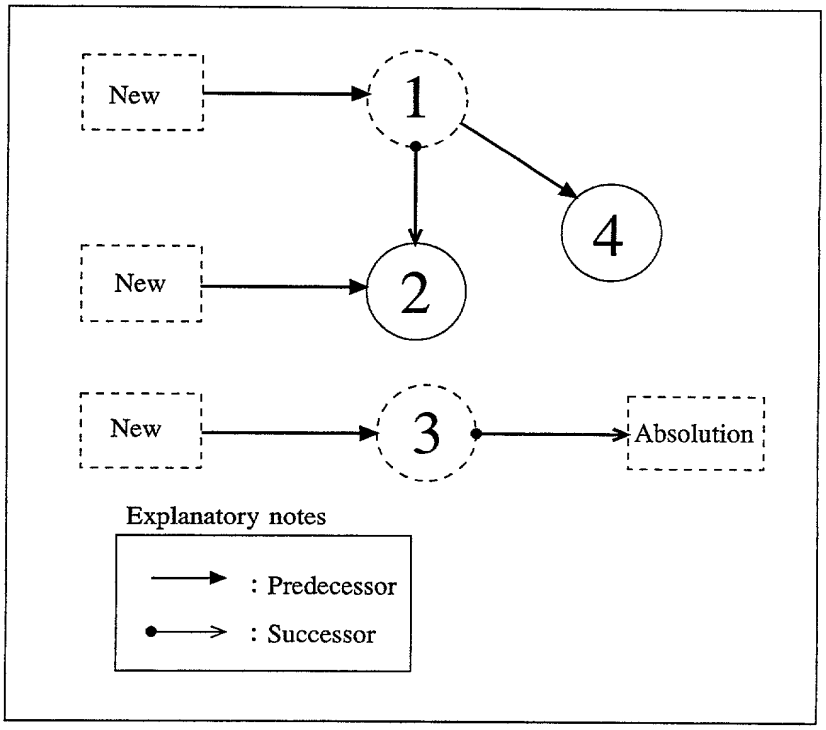

New
1
4
New
2
New
3
Absolution
Explanatory notes
: Predecessor
: Successor

Fig.40

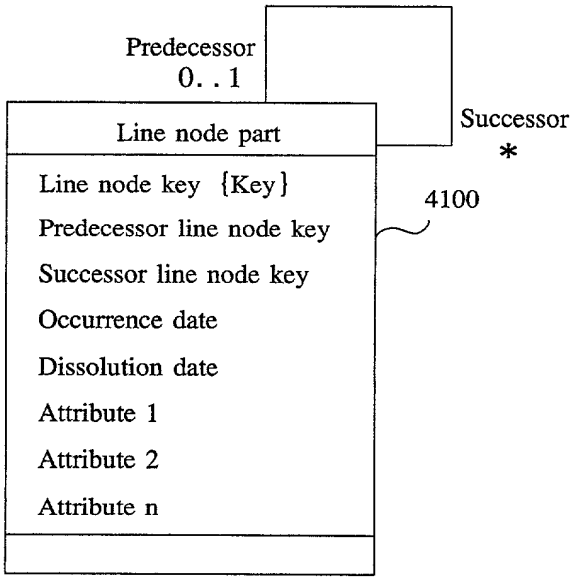

Predecessor
0..1
Line node part
Successor
*
Line node key {Key}
Predecessor line node key
Successor line node key
Occurrence date
Dissolution date
Attribute 1
Attribute 2
Attribute n
4100

Fig.41

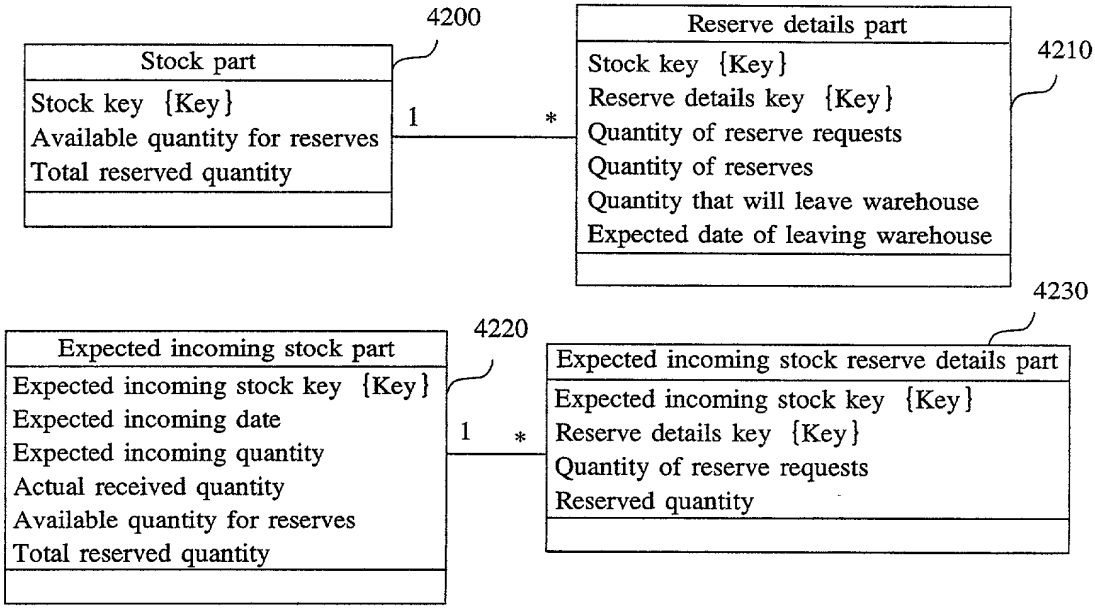

4200
Stock part
Stock key {Key}
Available quantity for reserves
Total reserved quantity
1
*
Reserve details part
Stock key {Key}
Reserve details key {Key}
Quantity of reserve requests
Quantity of reserves
Quantity that will leave warehouse
Expected date of leaving warehouse
4210
4230
4220
Expected incoming stock part
Expected incoming stock key {Key}
Expected incoming date
Expected incoming quantity
Actual received quantity
Available quantity for reserves
Total reserved quantity
1
*
Expected incoming stock reserve details part
Expected incoming stock key {Key}
Reserve details key {Key}
Quantity of reserve requests
Reserved quantity

Fig.42

Product (X-axis)	Organization (Y-axis)	Time (T-axis)		
		Business year	Month	Daily
Product type	Headquarters	○	—	—
	Business division	○	○	—
	Section	—	—	—
Model	Headquarters	—	—	—
	Business division	○	○	—
	Section	○	○	—
Product	Headquarters	—	—	—
	Business division	—	○	—
	Section	○	○	○

Fig.43

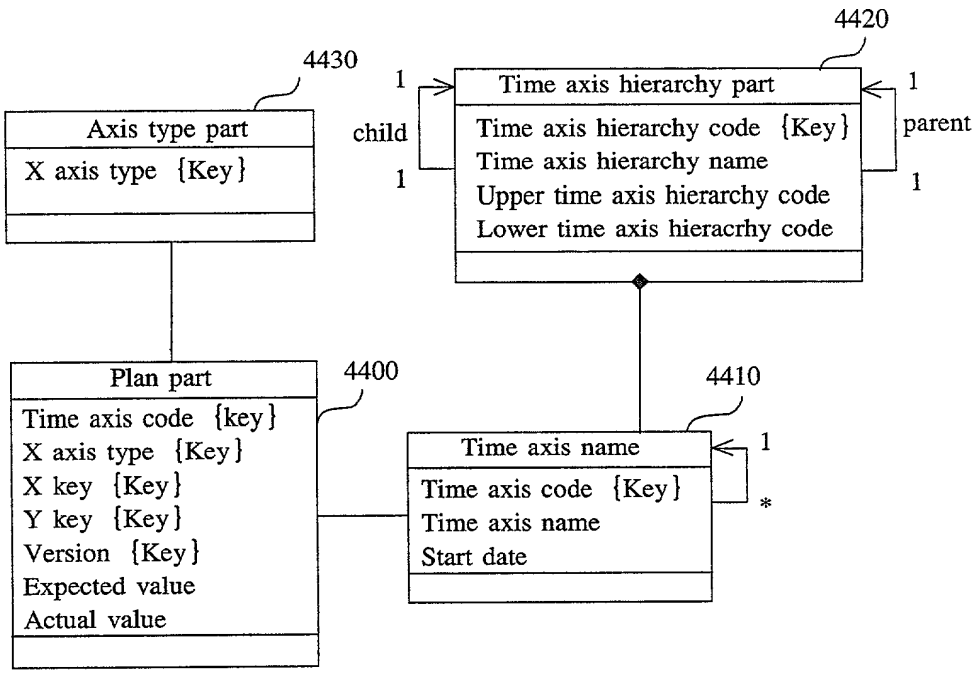


Fig.44